

1 **Amendment to the Claims**

2 **In the Claims:**

3 Please amend Claims 34, 37, 39, 42, 50, 54, 56, 60 and 61 as follows:

4 1. – 33. (Canceled)

5 34. (Currently Amended) A method for detecting a feature using an imaging system, where
6 the feature is part of an object and the feature can be labeled, comprising the steps of:

7 (a) labeling the feature such that a plurality of different optical signaling
8 components become bound to said feature, probes suitable for so labeling the feature comprising:

9 (i) a single type of probe comprising a binding element that selectively
10 binds to at least a portion of the feature, and a plurality of optical signaling components, at least two
11 of which are different, thereby enabling the plurality of different optical signaling components to be
12 bound to said feature; and

13 (ii) two different types of probes, each of which comprises a binding
14 element that selectively binds to at least a portion of the feature, and at least one optical signaling
15 component, such that the optical signaling components of the two different types of probes are not
16 identical, thereby enabling the plurality of different optical signaling components to be bound to said
17 feature;

18 (b) collecting light from said object along a collection path, the light that is collected
19 comprising light corresponding to each of the plurality of different optical signaling components that has
20 been simultaneously collected;

21 (c) dispersing the light that is traveling along the collection path into a plurality of
22 light beams, as a function of a ~~discriminable spectral~~ characteristic enabling the different optical
23 signaling components to be distinguished, each different light beam being dispersed at an angle
24 selected to ensure that each different light beam will be incident on a different portion of a single
25 detector used to collect light from the object;

26 (d) focusing each of the plurality of light beams onto [[a]] the single detector having
27 sufficient pixels to enable a plurality of non-overlapping two-dimensional images to be simultaneously
28 detected, to produce a respective image corresponding to that light beam, thereby simultaneously generating
29 a plurality of non-overlapping two-dimensional images, locations of probes bound to said feature included
30 in the plurality of non-overlapping two-dimensional images being optically discriminated, such that each of

1 the plurality of non-overlapping two-dimensional images are generated on the single detector, wherein an
2 image of each different optical signaling component bound to a single feature is dispersed to a different
3 portion of the detector, such that different optical signaling components are not coincident on the detector,
4 regardless of their relative position on the object;

5 (e) detecting the plurality of non-overlapping two-dimensional images to produce a
6 signal indicative of each optical signaling component, such that a different signal is produced for each of the
7 plurality of non-overlapping two-dimensional images; and

8 (f) analyzing each different signal produced for each of the plurality of non-overlapping
9 two-dimensional images to determine if indicative spectral signals produced by the plurality of different
10 optical signaling components are present, thereby establishing that the feature is part of the object.

11 35. (Previously Presented) The method of Claim 34, wherein the step of labeling the feature
12 comprises the step of exposing said object to the single type of probe, thereby binding said plurality
13 of optical signaling components of the single type of probe to said feature.

14 36. (Canceled)

15 37. (Currently Amended) The method of Claim 34, wherein the step of analyzing each
16 different signal produced for each of the plurality of non-overlapping two-dimensional images comprises
17 the step of determining if an intensity of a waveband of light indicative of said plurality of different
18 optical signaling components is present in that image.

19 38. (Previously Presented) The method of Claim 34, wherein said object comprises a
20 biological cell, and said feature comprises a cellular component.

21 39. (Currently Amended) The method of Claim 34, wherein the step of analyzing each
22 different signal produced for each of the plurality of non-overlapping two-dimensional images comprises
23 the step of determining if a multiplex of a spectral signature for each of the plurality of different
24 optical signaling components is present in that image, such that the following spectral signatures can
25 be differentiated, where A corresponds to a first optical signaling component, and B corresponds to a
26 second optical signal component, where light defining all such spectral signatures has been
27 simultaneously collected:

- 28 (a) a spectral signature comprising A-A-A-B;
29 (b) a spectral signature comprising A-A-B-B; and
30 (c) a spectral signature comprising A-B-B-B.

1 40. (Previously Presented) The method of Claim 34, wherein the step of labeling the feature
2 comprises the step of exposing said object to the two different types of probes, thereby binding the
3 plurality of different optical signaling components of the two different types of probes to said feature.

4 41. (Canceled)

5 42. (Currently Amended) A method for probing an object with probes to detect if any of a
6 plurality of specific features are part of the object, using an imaging system, wherein such probes can
7 be attached to each such feature, the method comprising the steps of:

8 (a) for each specific feature to be detected, providing each type of probe required
9 to uniquely label each specific feature that is part of the object, types of probes suitable for so
10 labeling each specific feature comprising:

11 (i) one type of probe including a binding element that selectively binds to
12 the feature, and a plurality of optical signaling components, at least two of which are different,
13 thereby enabling the plurality of different optical signaling components to be bound to said feature;
14 and

15 (ii) two different types of probes, each of which includes a binding element
16 that selectively binds to at least a portion of the feature, and at least one optical signaling component,
17 such that the optical signaling components of the two different types of probes are not identical,
18 thereby enabling the plurality of different optical signaling components to be bound to said feature;

19 (b) exposing said object to each type of probe required to uniquely label each
20 specific feature that is part of the object;

21 (c) collecting light from said object along a collection path, the light that is collected
22 comprising light corresponding to each optical signaling component used to label the plurality of specific
23 features that are part of the object, such light having been simultaneously collected;

24 (d) dispersing the light that is traveling along the collection path into a plurality of
25 light beams, as a function of a wavelength, such that each different light beam corresponds to a
26 different wavelength of light, each different light beam being dispersed at an angle selected to ensure
27 that each different light beam will be incident on a different portion of a single detector used to collect
28 light from the object;

29 (e) focusing each of the plurality of light beams corresponding to a different
30 wavelength onto a different portion of [[a]] the single detector, to produce a respective image corresponding

1 to that wavelength, thereby simultaneously generating a plurality of non-overlapping two-dimensional
2 images on the single detector, locations of probes bound to said feature included in the plurality of non-
3 overlapping two-dimensional images being optically discriminated, such that each different one of the
4 plurality of light beams is dispersed onto a different portion of the detector, so each pixel of each
5 respective image having the same wavelength is received at the same portion of the detector, while
6 being spaced apart from each pixel of each respective image having a different wavelength, such that
7 pixels of different wavelengths corresponding to an identical portion of the object are not coincident;

8 (f) detecting the plurality of non-overlapping two-dimensional images to produce a
9 signal indicative of each optical signaling component present in the plurality of non-overlapping two-
10 dimensional images and used to uniquely label each specific feature that is part of the object, such that
11 a different signal is produced for each of the plurality of non-overlapping two-dimensional images; and

12 (g) analyzing the signals produced for each of the plurality of non-overlapping two-
13 dimensional images to determine which specific feature is part of the object.

14 43. (Previously Presented) The method of Claim 42, wherein at least one specific feature to
15 be detected is labeled with the one type of probe including the plurality of optical signaling
16 components.

17 44. (Previously Presented) The method of Claim 42, wherein said object comprises a
18 biological cell, and each feature comprises a cellular component.

19 45. (Canceled)

20 46. (Previously Presented) The method of Claim 42, wherein at least one specific feature to
21 be detected is labeled with the two different types of probes including the optical signaling
22 components that are not identical.

23 47. – 48. (Canceled)

24 49. (Previously Presented) The method of Claim 42, wherein each optical signaling
25 component comprises a fluorescent dye, further comprising the step of directing sufficient energy
26 toward said object, such that the fluorescent dye is excited to emit a fluorescent light comprising a
27 uniquely discriminable characteristic of the optical signaling component.

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1 50. (Currently Amended) The method of Claim 42, wherein the step of analyzing each
2 different signal produced for each of the plurality of non-overlapping two-dimensional images comprises
3 the step of determining if a multiplex of a spectral signature for each of the plurality of different
4 optical signaling components is present in that image, such that the following spectral signatures can
5 be differentiated, where A corresponds to a first optical signaling component, and B corresponds to a
6 second optical signal component, where light defining all such spectral signatures has been
7 simultaneously collected:

- 8 (a) a spectral signature comprising A-A-A-B;
- 9 (b) a spectral signature comprising A-A-B-B; and
- 10 (c) a spectral signature comprising A-B-B-B.

11 51. (Previously Presented) The method of Claim 42, wherein at least one specific feature is
12 uniquely discriminable based on a spectral composition of light from a plurality of optical signaling
13 components bound to that at least one specific feature.

14 52. – 53. (Canceled)

15 54. (Currently Amended) A method for detecting a feature using an imaging system, where
16 the feature is part of an object and the feature can be uniquely labeled, comprising the steps of:

17 (a) labeling the feature such that a plurality of different optical signaling
18 components become bound to said feature, types of probes suitable for so labeling each specific
19 feature comprising:

20 (i) a single type of probe including a binding element that selectively binds
21 to the feature, and a plurality of optical signaling components, at least two of which are different,
22 thereby enabling the plurality of different optical signaling components to be bound to said feature;
23 and

24 (ii) two different types of probes, each of which includes a binding element
25 that selectively binds to at least a portion of the feature, and at least one optical signaling component,
26 such that the optical signaling components of the two different types of probes are not identical,
27 thereby enabling the plurality of different optical signaling components to be bound to said feature;

28 (b) collecting light from said object along a collection path, while there is relative
29 motion between the object and an apparatus employed to collect the light, the light that is collected
30 comprising light corresponding to each of the plurality of different optical signaling components that

has been simultaneously collected, such that the collection path is substantially orthogonal to an axis of the relative motion, a field angle in object space along the collection path being sufficiently small so as to enable light collected from the object to be spectrally dispersed onto a single detector;

(c) spectrally dispersing the light that is traveling along the collection path into a plurality of light beams, as a function of a wavelength, each different light beam being dispersed at an angle selected to ensure that each different light beam will be incident on a different portion of the single detector used to collect light from the object;

(d) focusing each of the plurality of light beams to produce a respective image corresponding to that light beam on the single detector, thereby simultaneously generating a plurality of spectrally distinguishable non-overlapping two-dimensional images on the single detector each different spectral image being dispersed onto a different portion of the detector, such that pixels of different spectral non-overlapping two-dimensional images corresponding to an identical portion of the object are not coincident;

(e) detecting the plurality of non-overlapping two-dimensional images to produce a signal indicative of each optical signaling component, such that a different signal is produced for each of the plurality of non-overlapping two-dimensional images; and

(f) analyzing each different signal to determine if a spectral component due to each optical signaling component bound to said feature is present in the image, thereby establishing that said feature is part of the object.

55. (Canceled)

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1 56. (Currently Amended) A method for detecting a feature using an imaging system, where
2 the feature is part of an object and the feature can be uniquely labeled, comprising the steps of:

3 (a) labeling the feature such that a plurality of different optical signaling
4 components become bound to said feature;

5 (b) collecting light from said object along a collection path, while there is relative
6 motion between the object and an apparatus employed to collect the light, the light that is collected
7 comprising light corresponding to each of the plurality of different optical signaling components and being
8 simultaneously collected;

9 (c) spectrally dispersing the light that is traveling along the collection path into a
10 plurality of light beams such that light from different optical signaling components is included in
11 different ones of plurality of light beams, each different light beam being dispersed at an angle
12 selected to ensure that each different light beam will be incident on a different portion of a single
13 detector used to collect light from the object;

14 (d) focusing each of the plurality of light beams onto a different portion of [[a]] the
15 single detector to produce a respective image corresponding to that light beam, thereby simultaneously
16 generating a plurality of spectral non-overlapping two-dimensional images on the single detector, such that
17 each different spectral image is dispersed onto a different portion of the detector, such that pixels of
18 different spectral non-overlapping two-dimensional images corresponding to an identical portion of the
19 object are not coincident;

20 (e) detecting the plurality of non-overlapping two-dimensional images to produce a
21 signal indicative of each optical signaling component, such that a different signal is produced for each of the
22 plurality of non-overlapping two-dimensional images; and

23 (f) analyzing each different signal produced for each of the plurality of non-overlapping
24 two-dimensional images to determine if indicative spectral signals produced by the plurality of different
25 optical signaling components are present, thereby establishing that the feature is part of the object.

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1 57. (Previously Presented) The method of Claim 56, wherein the step of labeling the feature
2 such that a plurality of different optical signaling components become bound to said feature
3 comprises the step of exposing the object to a single type of probe comprising a binding element that
4 selectively binds to at least a portion of the feature, and a plurality of optical signaling components, at
5 least two of which are different, thereby enabling the plurality of different optical signaling
6 components to be bound to said feature.

7 58. (Previously Presented) The method of Claim 56, wherein the step of labeling the feature
8 such that a plurality of different optical signaling components become bound to said feature
9 comprises the step of exposing the object to two different types of probes, each of which comprises a
10 binding element that selectively binds to at least a portion of the feature, and at least one optical
11 signaling component, such that the optical signaling components of the two different types of probes
12 are not identical, thereby enabling the plurality of different optical signaling components to be bound
13 to said feature.

14 59. (Canceled)

15 60. (Currently Amended) A method for probing an object with probes to detect if any of a
16 plurality of specific features are part of the object, using an imaging system, wherein such probes can
17 be attached to each such specific feature, the method comprising the steps of:

18 (a) for each specific feature to be detected, providing each type of probe required
19 to uniquely label each specific feature that is part of the object, types of probes suitable for so
20 labeling each specific feature comprising:

21 (i) plural signaling probes, each plural signaling probe comprising a
22 binding element that selectively binds to at least a portion of said specific feature, and a plurality of
23 optical signaling components, at least two of which are different, thereby enabling a plurality of
24 different optical signaling components to be bound to said specific feature if said specific feature is
25 part of the object; and

26 (ii) mono signaling probes, each mono signaling probe comprising a
27 binding element that selectively binds to at least a portion of said specific feature, and one optical
28 signaling component, such that two different types of mono signaling probes, each different type
29 including a different optical signaling component, are needed to enable a plurality of different optical
30 signaling components to be bound to said specific feature if said specific feature is part of the object;

1 (b) exposing said object to each type of probe required to uniquely label each
2 specific feature that is part of the object;

3 (c) collecting light from said object along a collection path, the light that is collected
4 comprising light corresponding to each optical signaling component used to label the plurality of specific
5 features that are part of the object, such light having been simultaneously collected;

6 (d) spectrally dispersing the light that is traveling along the collection path into a
7 plurality of light beams as a function of a plurality of different discriminable characteristics of the
8 light, each different light beam being dispersed at an angle selected to ensure that each different light
9 beam will be incident on a different portion of the single detector used to collect light from the object;

10 (e) focusing each of the plurality of light beams onto a different portion of [[a]] the
11 single detector, to produce a respective image corresponding to that light beam, thereby simultaneously
12 generating a plurality of spectral non-overlapping two-dimensional images on the single detector, locations
13 of probes bound to said feature included in the plurality of non-overlapping two-dimensional images being
14 optically discriminated, such that each different spectral image is dispersed onto a different portion of the
15 detector, such that pixels of different spectral non-overlapping two-dimensional images corresponding to
16 an identical portion of the object are not coincident;

17 (f) detecting the plurality of non-overlapping two-dimensional images to produce a
18 signal indicative of each optical signaling component present in the plurality of non-overlapping two-
19 dimensional images and used to uniquely label each specific feature that is part of the object, such that
20 a different signal is produced for each of the plurality of non-overlapping two-dimensional images; and

21 (g) analyzing the signals produced for each of the plurality of non-overlapping two-
22 dimensional images to determine which specific feature is part of the object.

23 61. (Currently Amended) A method for detecting a feature using an imaging system, where
24 the feature is part of an object and the feature can be uniquely labeled, comprising the steps of:

25 (a) labeling the feature such that a plurality of different optical signaling
26 components become bound to said feature, the feature being labeled using either:

27 (i) one type of probe including a binding element that selectively binds to
28 the feature, and a plurality of optical signaling components, at least two of which are different,
29 thereby enabling the plurality of different optical signaling components to be bound to said feature; or
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1 (ii) two different types of probes, each of which includes a binding element
2 that selectively binds to at least a portion of the feature, and at least one optical signaling component,
3 such that the optical signaling components of the two different types of probes are not identical,
4 thereby enabling the plurality of different optical signaling components to be bound to said feature;

5 (b) collecting light from said object along a collection path, while there is relative
6 motion between the object and an apparatus employed to collect the light, the light that is collected
7 comprising light corresponding to each of the plurality of different optical signaling components that
8 has been simultaneously collected;

9 (c) spectrally dispersing the light that is traveling along the collection path into a
10 plurality of light beams as a function of a plurality of different discriminable characteristics of the
11 light, each different light beam being dispersed at an angle selected to ensure that each different light
12 beam will be incident on a different portion of the single detector used to collect light from the object;

13 (d) focusing each of the plurality of light beams onto a different portion of the
14 single detector to produce a respective image corresponding to that light beam, thereby
15 simultaneously generating a plurality of spectral non-overlapping two-dimensional images on the
16 single detector, such that each different spectral non-overlapping two-dimensional image is dispersed
17 onto a different portion of the detector, such that pixels of different spectral non-overlapping two-
18 dimensional images corresponding to an identical portion of the object are not coincident;

19 (e) detecting the plurality of non-overlapping two-dimensional images to produce a
20 signal indicative of each optical signaling component, such that a different signal is produced for
21 each of the plurality of non-overlapping two-dimensional images; and

22 (f) analyzing each different signal to determine if a spectral component due to
23 each optical signaling component bound to said feature is present in the image, thereby establishing
24 that said feature is part of the object.